MARYLAND
DEPARTMENT OF
NATURAL RESOURCES

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Maryland Roadside Tree Care Expert Exam Study Guide

For Exam Domain:

Chapter 6: Problem Diagnosis

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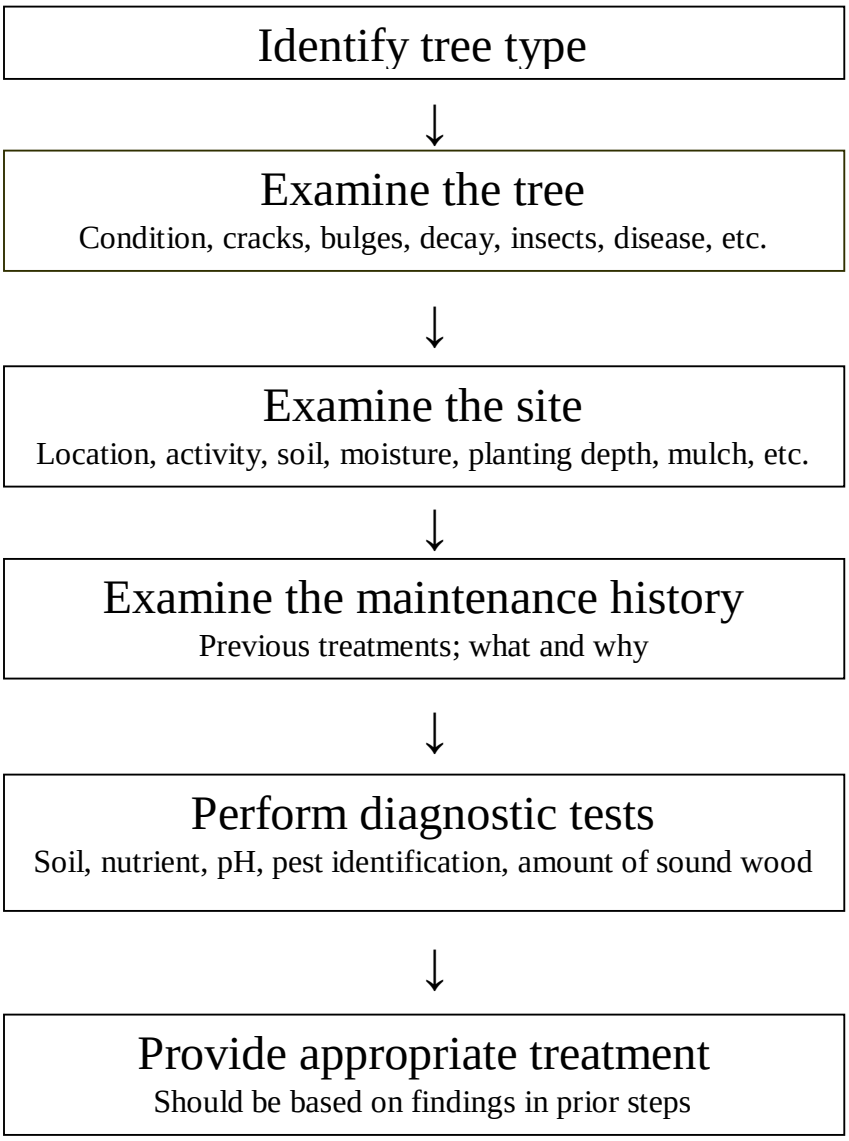
Trees often decline or experience problems due to multiple factors. Problem diagnosis is more complex than simply looking for the first insect or disease you can find and then declaring that the problem has been identified. A tree expert would follow a pattern of research, observation and testing to diagnose and recommend treatment for a tree.

The cause of poor plant health usually is combination of nonliving stresses (abiotic) and living contributors (biotic) and a systematic process is the key to properly identifying plant diseases and disorders. A **Systematic Process** requires us to:

1. Accurately identify the tree.
   - What type of tree are we diagnosing? The "family history" of the tree is very important, as certain pests are specific to certain species, genera, or families of plants.
2. Look for a pattern of abnormality.
   - The *Body Language of Trees* tells us that trees grow and develop in a logical way, and if something looks unusual it means something may be wrong. Learning how to read these signs can help us understand what the tree is "telling" us about its condition. Trunk lean, decay fungi, root plate heaving, bulges on trunks, and spots on leaves all indicate potential problems. Trees will tell us what the problem is if we look carefully and thoroughly at the entire tree: roots, stem, and crown.
3. Carefully examine the site.
   - Examine the site around the tree. Trenching, ground disturbance, herbicide application, storm damage, and other factors that could affect tree health may be revealed by examining the site surrounding the tree.
4. Examine any available site maintenance history.
   - The "medical history" of a tree, if available, should provide background on attending tree experts and treatments performed. We may be able to contact prior practitioners to confer on what was done and why, or find a pattern of previous problems based on prior treatments performed.
5. Perform certain diagnostic tests, if appropriate.
   - A soil test can provide information on nutrient deficiencies of pH problems. Invasive but useful tools for evaluating tree growth include the

increment borers and various types of decay detection equipment. These tools can allow the tree expert to examine changes in tree ring growth over time.

Non-invasive tools for evaluating the extent of internal decay include tools using radar technologies or sound waves. These tools can detect the quantity and quality of remaining wood without disturbing the wood of the tree. Root collar excavations, whether performed solely by hand or with mechanical assistance, can reveal stem girdling roots, whether a tree was planted too deeply, or whether the burlap and twine or wire basket was removed at planting.



Injuries caused by ice, lightning, or pesticides are examples of impacts from abiotic (non-living) factors. In urban areas, most tree failure occurs as a result of storms. If a vertical strip of bark is missing from a point in the crown down to the ground, with a rough grove that follows the grain of the wood, a likely cause is a lightning strike. Other abiotic disorders include damage

from temperature extremes, pollution damage, and chemical injury (normally from herbicide misapplication).

Diseases caused by bacteria, nematodes, or fungi are examples of impacts from biotic (living) factors. Holes in the bark that are in uniform horizontal bands around the trunk are likely caused by sapsuckers. Insects with chewing mouthparts include borers, caterpillars, and leaf miners and do not include mites.

Sign or Symptom	Possible Cause
Sooty mold	Infestation by aphids or scale
White to gray-white fungus on leaf and shoot surfaces	Powdery mildew
Canker (localized dead tissue) on stem or branch	Wounding or disease
Dark, discolored streaks in the young xylem	Verticillium wilt
Root galls	Insects, nematodes, or nitrogen-fixing bacteria
Mushrooms or conks	Decay fungi
Lack of trunk flare on a portion of the trunk at the soil line	Stem girdling root
Small emergence holes in the trunk or branches with frass (looks like sawdust)	Wood-boring insect
Holes in leaves	Insects or diseases
General yellowing of leaves (Chlorosis)	Sucking insects, pH problems, nutrient deficiency
Wilting of leaves	Lack of water, vascular system disease

In some cases the most obvious pest is not the primary culprit. Sucking insects, though easy to detect, are not normally primary causes of tree death. Some apparent diagnostic clues do not indicate anything. For example, exfoliation (peeling) of the bark on a mature plane tree (*Platanus x acerfolia*) is normal. However, peeling bark on type of tree that does not have exfoliating bark under normal conditions would be a cue for further assessment.

Some plant pests travel on their own. Some are carried by vectors (carriers). Elm yellows and Dutch elm disease are both examples of diseases that are often transmitted by insect vectors. Bacterial Leaf Scorch is thought to be transmitted by insect vectors. Some pests transported primarily by people. Emerald Ash Borer, which leaves a “d-shaped” exit hole in the dark, was introduced in Maryland on infested nursery stock. The Asian Longhorned Beetle has not yet been detected in Maryland.

When collecting samples for the purpose of diagnosing plant problems, it is important to collect samples that include the transition from diseased or affected tissue to healthy tissue so that the diagnostician can compare the healthy and infected portions of the plant.

Tree Experts often are requested to perform risk tree assessments. The need for risk tree assessment is normally based on the premise that personal injury or property damage could result if a certain tree failed. Because liability is possible, such assessments should be documented in writing. People, structures, improvements, and vehicles are potential targets for hazardous trees. A hazard tree is a tree with a defect and a target. An unsound tree in an area with no target is not a hazard. If a previously unimproved area becomes developed, there may be a corresponding change in the need for tree assessment.

Sometimes the risk of failure may be due to the type of tree. Fast-growing trees are usually weak-wooded and failure prone. The tree expert will normally read the tree's "body language" for things out of the ordinary, including:

- Longitudinal cracks or splits in the trunk or branches;
- Branches or stems that lack taper;
- Codominant stems or branches;
- An external swelling or bulge (a likely indicator of internal decay or a cavity);
- An external rib on a tree (a likely indicator of an internal crack);
- Cracks of lifting of the soil on the opposite side of the lean on a leaning tree likely indicate movement of the root system, soil failure, and/or pending tree failure.

Decay which only affects the dead tissue in the center of the tree trunk is normally referred to as heartrot. Most experts agree that 30-35 percent loss of the stem diameter due to heartrot requires that some action be taken to address the risk of failure. Mushrooms or conks on a trunk or branch indicate a need for further assessment to determine whether or not internal decay is present.

Brown rots are fungi that consume cellulose, resulting in wood that is stiff but brittle like a hard biscuit and subject to failure without warning. White rots are fungi that consume both cellulose and lignin, resulting in soft and flaky or stringy decay that is whitish to reddish in color.